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REPUBLIC OF PARAGUAY
NEW AIRPORT CONSTRUCTION PROJECT
IN CIUDAD PRESIDENTE STROESSNER
FEASIBILITY STUDY
FINAL REPORT

FEBRUARY 1980

JAPAN INTERNATIONAL COOPERATION AGENCY

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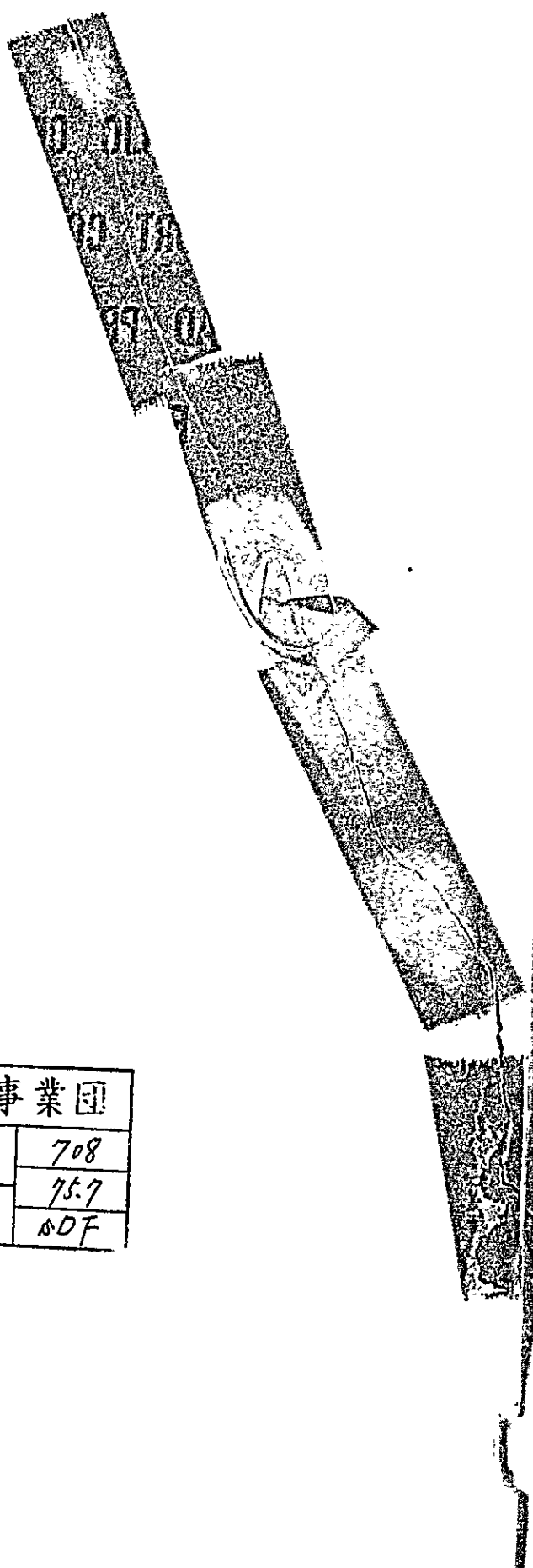
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FOREWORD

In response to the request of the Government of the Republic of Paraguay, the Government of Japan agreed to conduct a feasibility study on the New Airport Construction Project in Ciudad Presidente Stroessner, and the study has been carried out by the Japan International Cooperation Agency (JICA).

The JICA dispatched to Paraguay a preliminary survey mission headed by Mr. Hiroshi Katsube of the Civil Aviation Bureau, Ministry of Transport in December 1978, and the Feasibility Study was started in April 1979. The present Final Report is based on the Interim Report of October 1979 and Draft Final Report of December 1979 as well as on the comments made thereon by the Government of Paraguay and on the subsequent study made in Japan.

In view of the great contribution this project is expected to make not only to the regional development of the Alto Parana district, of which Ciudad Presidente Stroessner is the capital, but also to the economic development of the entire Republic, I hope that the present study will serve to expedite implementation of the project, and also contribute to furthering the mutual goodwill and friendship of our two nations.

I wish to express my heartfelt appreciation for the close cooperation accorded to our study mission by the officials concerned of the Government of Paraguay.

Tokyo, February 1980



Keisuke Arita
President
JAPAN INTERNATIONAL COOPERATION AGENCY
Tokyo, Japan

NEW AIRPORT CONSTRUCTION PROJECT
IN CIUDAD PRESIDENTE STROESSNER
FEASIBILITY STUDY

- FINAL REPORT -

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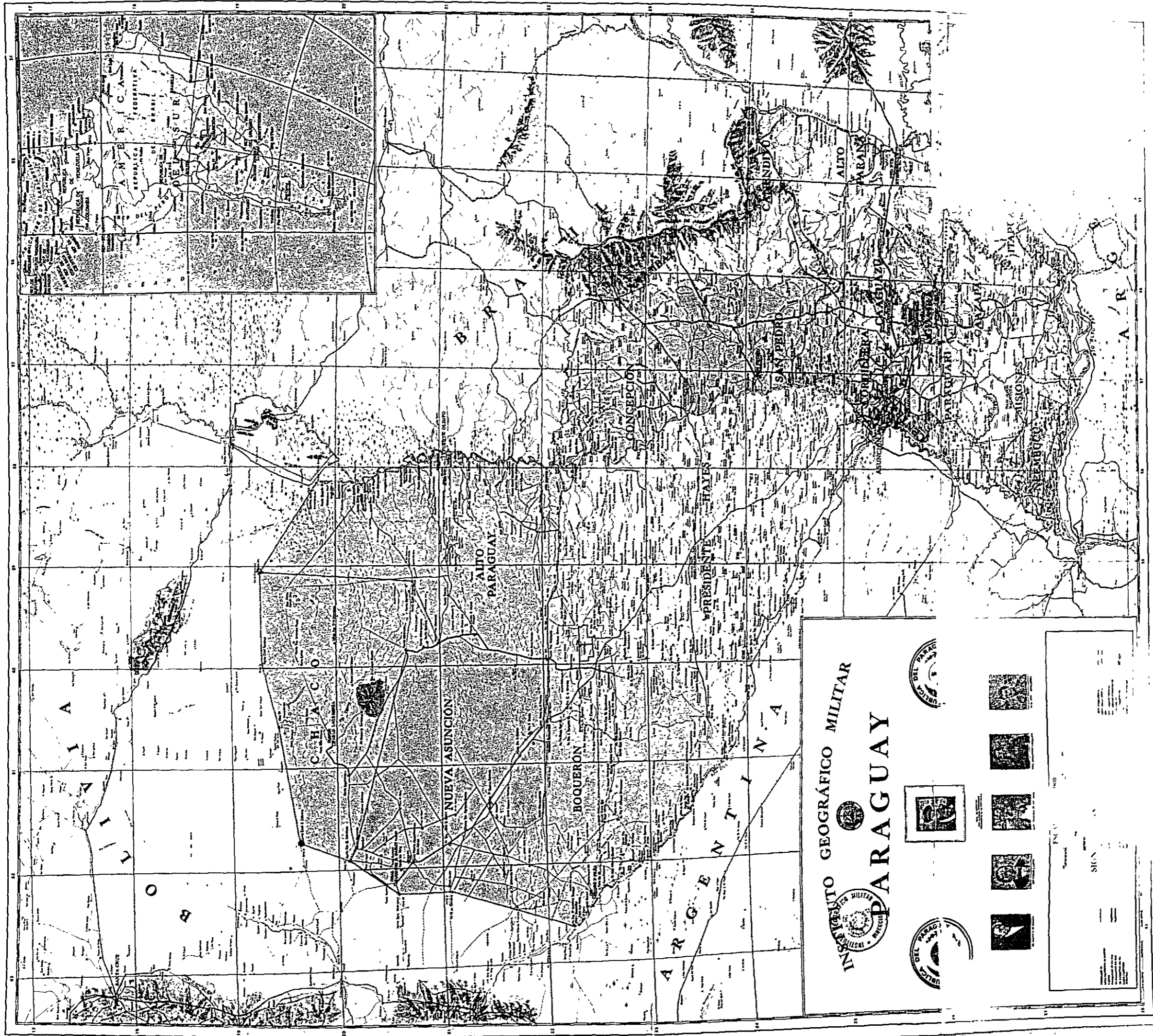
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SUPPLEMENTARY CONSIDERATION ON AIR TRAFFIC FORECAST



INSTITUTO GEOGRÁFICO MILITAR

PARAGUAY

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NEW C P S AIRPORT 2004

SUMMARY AND CONCLUSION

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SUMMARY AND CONCLUSION

SUMMARY

1. Background of Project

The Government of the Republic of Paraguay, recognizing the importance of aviation in the overall development of the country, implemented in 1975 with the financing by the International Bank for Reconstruction and Development a feasibility study on the development of eight local airports and of the national aeronautical communications system as the first phase of the national aviation development project, and the final report of the study made by a British consulting firm was submitted to the Paraguay Government in 1977.

The study revealed the top priority of the airport in the Ciudad Presidente Stroessner area in the order of development on account of its very important role expected in the future air route network of the country. Based on this study result and on the overall development plan of the region, the Government of the Republic established a policy to develop an international airport in the area, and in April 1978 officially requested the Government of Japan to render technical assistance in connection therewith. In response to the request the Japan International Cooperation Agency (JICA) sent a mission to confer with the officials concerned of the Government of the Republic and to determine the Scope of Works of the study, which the JICA subsequently decided to undertake, and the results of which are made the contents of the present final report.

2. Need for New Airport in CPS

"PLAN NACIONAL DE DESARROLLO ECONOMICO Y SOCIAL" envisages the Alto Parana District centered around CPS to be the potential center of the industrial, agricultural and tourism development of the country as well as of trade. In order to realize fully the future development potential of this region, development of a new international airport in the CPS area is not only necessary but indispensable. The new airport will also be given a significant role as an alternate airport of the Asuncion International airport which is currently being forced to depend on airports of neighboring countries for the service.

3. Air Traffic Forecast

Air transport demand both of the entire Paraguay and of the CPS area is considered to have a close relationship with the level of economic activities of the country. Gross Domestic Product of Paraguay being regarded one of the best economic indices of the level of economic activities of the country, was used as the independent variable in regression models of air traffic forecasting in this study. Table S-1 summarizes the air traffic forecast at the New CPS Airport.

Table S.1 SUMMARY OF AIR TRAFFIC FORECAST AT NEW CPS AIRPORT

| | 1994 | 2004 |
|-----------------------------------|--------------|---------------|
| Annual Air Traffic | | |
| Passengers | | |
| International Emb. & Disemb. | 292.9 | 552.2 |
| Transit | <u>32.1</u> | <u>60.7</u> |
| Total | 325.0 | 612.9 |
| Domestic Emb. & Disemb. | 97.3 | 179.7 |
| Transfer | <u>116.7</u> | <u>214.3</u> |
| Total | 214.0 | 394.0 |
| Cargo (metric tons) | | |
| International | 3,020.4 | 5,837.8 |
| Domestic | 1,979.8 | 3,785.2 |
| Aircraft Movements | | |
| International Passenger Flight | 3,900 | 6,900 |
| Domestic Passenger Flight | 5,940 | 8,640 |
| International Freighter | <u>0</u> | <u>71</u> |
| Total | 9,840 | 15,611 |
| General Aviation (Small Aircraft) | 6,960 | 11,120 |

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4. Airport Facility Requirements

The facility requirements to accommodate the forecast air transport demand for the years 1994 and 2004 were developed as summarized in Table S-2, in conformity with the ICAO standards and/or the FAA regulations.

5. Site Selection

As a result of the field survey and subsequent home office study the site situated to the west of CPS at Calle 24 about 3 km north of Ruta 7 was recommended as the most suitable, and this site was officially selected by the Government of the Republic in July 1979 as the site for the new airport construction.

6. Airport Facility and Airspace Use Plan

Airport Facility Plan

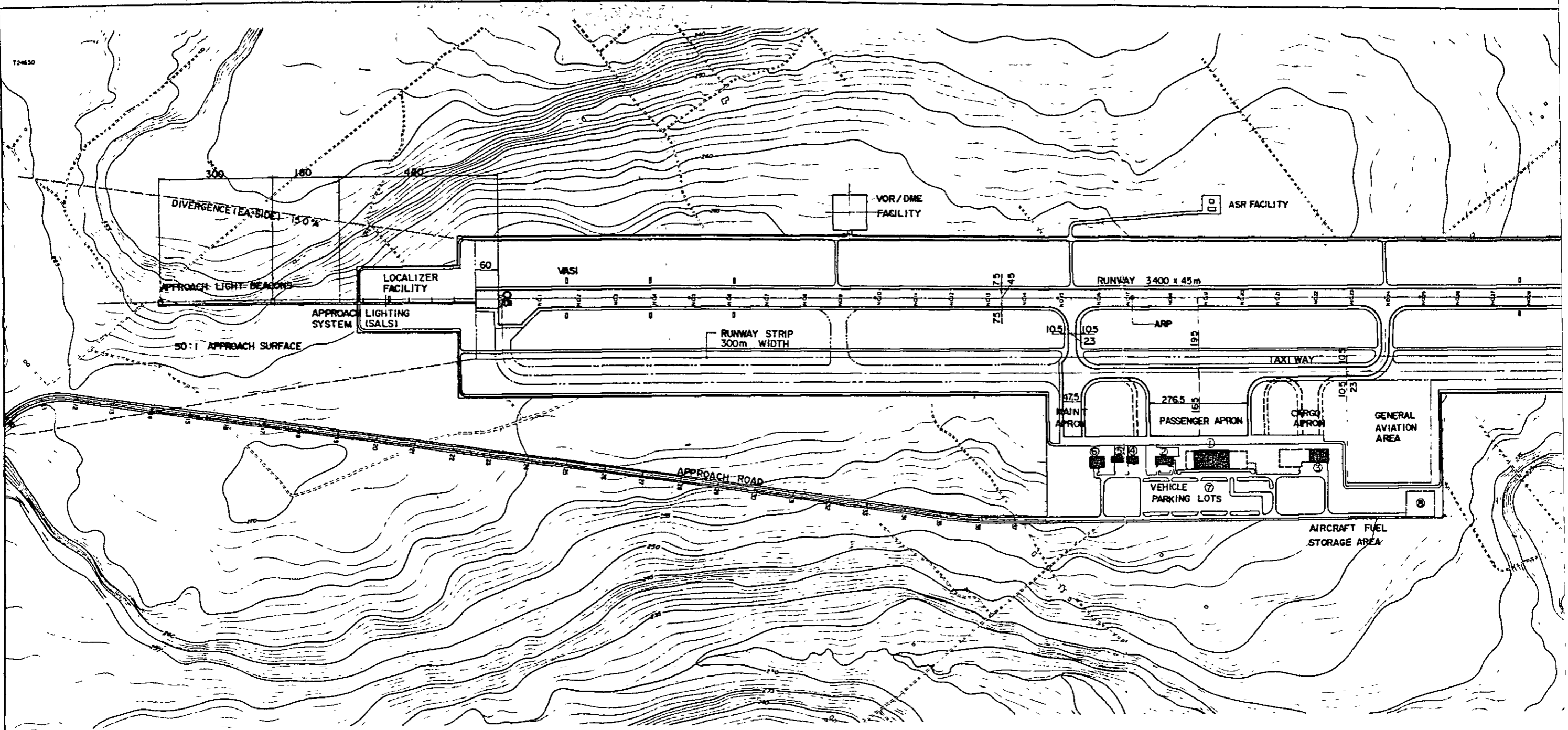
Planning of the airport facility was made for the assumed construction at the selected site in two stages, namely the first stage to be serviceable from 1985 through 1994, and the second and ultimate stage to be serviceable through the year 2004. Fig. S-1 shows the layout plan of the New CPS Airport, and the outline of the New CPS Airport is given in Table S-3.

Airspace Use Plan

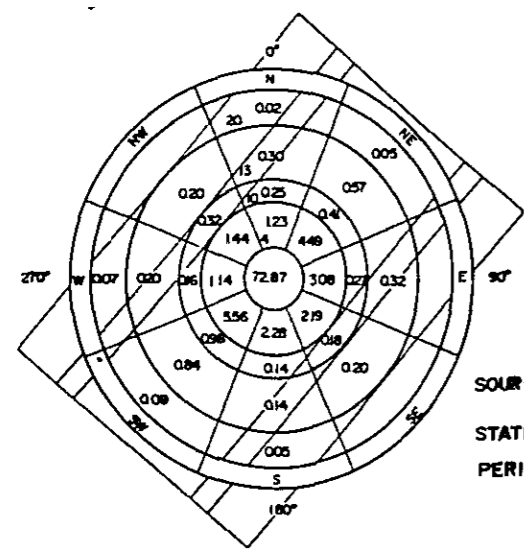
Instrument approach and departure procedures at the new airport was established in accordance with the PANS-OPS criteria (ICAO Doc. 8168/611/3). Wherever necessary planning was made by referring also to the "Terminal Instrument Procedures" (FAA), and the "Criteria for Establishment of Instrument Approach and Departure Procedures and Weather Minima" established by the Civil Aviation Bureau of Japan.

Table S.2 AIRPORT FACILITY REQUIREMENTS

| | Stage I | Stage II |
|---|--|----------------------|
| Runway Strip | 3,520m x 300m | |
| Runway Cat-I ILS Orientation | 3,400m x 45m S 025° 27', W 054° 51' | |
| Taxiway | 161m x 23m x 2 | |
| Aprons Passenger | 42,400m ² | 55,100m ² |
| Cargo | - | 6,800m ² |
| Maintenance | 7,300m ² | 7,300m ² |
| General Aviation | 52,500m ² | 70,000m ² |
| Buildings Passenger | 8,100m ² | 14,200m ² |
| Cargo | 1,800m ² | 5,100m ² |
| Administration | 2,300m ² | |
| Radio Nav-aids, Telecommunications, & Meteorological Service Facilities | Cat-I ILS, VOR/DME, NDB, etc. | |
| Airport Surveillance Radar | ASR, SSR with alphanumeric display | |
| Airfield Lighting | Cat-I ILS | |
| Others | Rescue & Fire fighting Fuel Storage & Distribution Utilities | |



WIND ROSE



SOURCE : DIRECTION DE METEOROLOGIA
 STATION: EXISTING CPS AIRPORT
 PERIOD: 1976 ~ 1978

AIRPORT DATA

AIRPORT ELEVATION 257 m
 AIRPORT REFERENCE POINT (ARP) S 025° 27'
 COORDINATES W 054° 51'
 AIRPORT & TERMINAL NAV AIDS VOR
 MEAN MAX. TEMP OF HOTTEST MONTH 33 °C

RUNWAY DATA

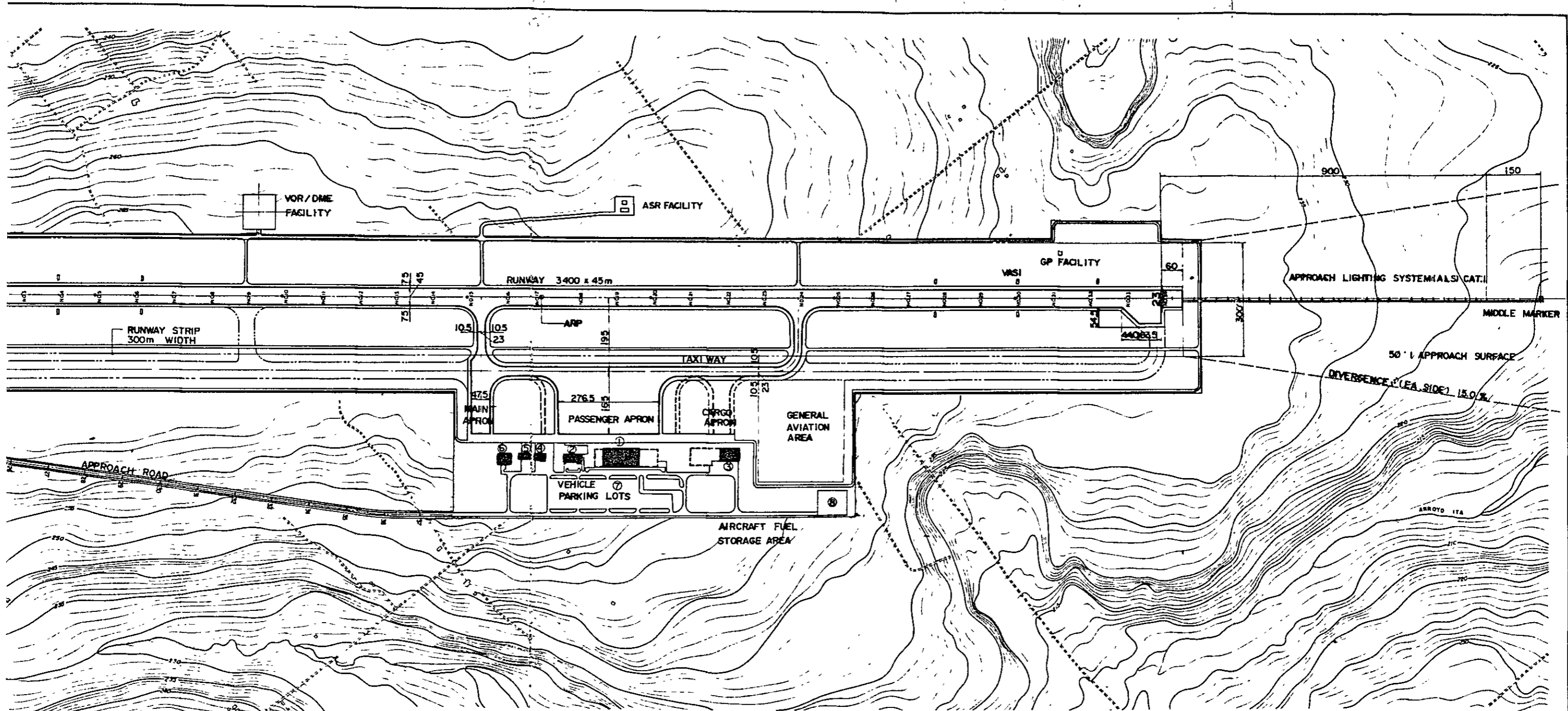
EFFECTIVE RUNWAY GRADIENT (IN%) 0.825
 % WIND COVERAGE 99.9
 20 KNOTS 99.2
 13 KNOTS 98.2
 10 KNOTS 98.2
 RUNWAY-23 B747, L-1011, DC-8 CLASS
 PAVEMENT STRENGTH 50 I
 APPROACH SLOPES HIRL
 LIGHTING ICAO STANDARDS
 MARKING ILS, ALS, SALS, VASIS
 NAVIGATIONAL AIDS

LEGEND
 [Solid Line] STAGE I
 [Dashed Line] STAGE II

BUILDINGS

- ① PASSENGER TERMINAL BUILDING
- ② AIRPORT ADMINISTRATION BUILDING
- ③ INTERNATIONAL CARGO BUILDING
- ④ DOMESTIC CARGO BUILDING
- ⑤ FIRE STATION
- ⑥ MAIN SUB-STATION
- ⑦ PARKING LOT
- ⑧ FUEL STORAGE

LEGEND
 [Solid Box] STAGE I
 [Dashed Box] STAGE II



AIRPORT DATA
 AIRPORT ELEVATION 257 m
 AIRPORT REFERENCE POINT (ARP) S 025° 27'
 COORDINATES W 054° 51'
 AIRPORT & TERMINAL NAV AIDS VOR
 MEAN MAX. TEMP OF HOTTEST MONTH 33 °C

RUNWAY DATA
 EFFECTIVE RUNWAY GRADIENT (IN%) 0.825
 % WIND COVERAGE 20 KNOTS 99.9
 13 KNOTS 99.2
 10 KNOTS 98.2
 PRECISION APPROACH RUNWAY CAT I
 PAVEMENT STRENGTH B7M7, L-1011, DC-8 CLASS
 APPROACH SLOPES 50:1
 LIGHTING HIRL
 MARKING ICAO STANDARDS
 NAVIGATIONAL AIDS ILS, ALS, SALS, VASIS

BUILDINGS
 ① PASSENGER TERMINAL BUILDING
 ② AIRPORT ADMINISTRATION BUILDING
 ③ INTERNATIONAL CARGO BUILDING
 ④ DOMESTIC CARGO BUILDING
 ⑤ FIRE STATION
 ⑥ MAIN SUB-STATION
 ⑦ PARKING LOT
 ⑧ FUEL STORAGE

LEGEND
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LEGEND
 [Solid Black] STAGE I
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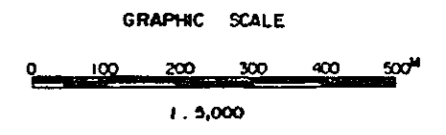


Fig. S-1

REPUBLICA DEL PARAGUAY
 ADMINISTRACION NACIONAL DE
 AEROPUERTOS CIVILES

NEW CPS AIRPORT DEVELOPMENT

LAYOUT - 2

FEB. 1980

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JAPAN INTERNATIONAL COOPERATION AGENCY

Table S.3 OUTLINE OF NEW CPS AIRPORT

| Development Stages | | STAGE I | STAGE II |
|--------------------------------------|--|--|--|
| Items | | 1994 | 2004 |
| Airport Basic Data | Location: ARP: Elevation Coordinate Runway: Orientation Airport Premises | The Site is situated to the west of CPS at Calle 24 about 3km north of Route 7. 257m S 025° 27', W 054° 51' 05 - 23 4,940,000m ² | |
| Air Traffic Demand Forecast (Annual) | Passengers International Domestic Total Cargo (Tones) International Domestic Total A/C Movements Scheduled General Aviation | 325,000 214,000 539,000 3,020.4 1,979.8 5,000.2 9,840 6,960 | 612,900 394,000 1,006,900 5,837.8 3,785.2 9,623.0 15,611 11,120 |
| Airfield Facilities | Runway Strip Runway Shoulder Taxiways Exit Shoulder Aprons Passenger Cargo A/C Maintenance General Aviation Clearance between Runway & Taxiway Centerline | 3,520m x 300m 3,400m x 45m 7.5m Width 161 x 23m x 2ea. 10.5m 42,443m ² - 7,291m ² 52,500m ² 195m | 55,107m ² 6,831m ² 7,291m ² 70,000m ² |
| Aeronautical Telecommunications | | 1 set | |
| Radio Navigational Aids | | Cat-I ILS, VOR/DME, NDB | |
| Meteorological Services Facility | | 1 Set | |
| Airfield Lighting Facility | | 1 Set | |
| Airport Surveillance Radar | | 1 Set | |
| Buildings | Passenger Cargo Administ./Operation Fire Station Main Substation Others | 8,100m ² 1,800m ² 2,300m ² 460m ² 980m ² | 14,200m ² 5,100m ² 2,300m ² 460m ² 980m ² |
| | | Substation, Navaid, Housing | |
| Car Parking (Number of Car) | | 447 | 689 |
| Utilities | | Power, Water, Sewage Treatment, Telephone | |
| Aircraft Fuel Supply System | | Hydrant System | |



In order to maintain the required separation from the procedures of the existing airport at Foz do Iguacu in Brazil, approach procedures were planned so that the final approach is commenced directly from the holding fix without making intermediate approach.

7. Airport Premises

A total area of about 494 hectares was calculated to be necessary for the airport premises to accommodate the planned facilities including the 3,400 meter runway, with due consideration for future terminal expansion as well as for the necessary noise buffer zone to avoid the anticipated noise nuisance in the future.

8. Construction Cost

Construction cost of the New CPS Airport by development stage is estimated as tabulated in Table S-4 below.

Table S.4 ESTIMATED CONSTRUCTION COST OF NEW CPS AIRPORT

(Unit: Thousand US\$)

| Cost Item | Stage I | | | Stage II | | | Total | | |
|--|-----------------|---------------|--------|-----------------|---------------|--------|-----------------|---------------|--------|
| | Foreign Portion | Local Portion | Total | Foreign Portion | Local Portion | Total | Foreign Portion | Local Portion | Total |
| | | | | | | | | | |
| Civil Works | 16,822 | 12,848 | 29,670 | 536 | 422 | 958 | 17,358 | 13,270 | 30,628 |
| Building & Equipment | 10,557 | 3,365 | 13,922 | 5,677 | 2,067 | 7,744 | 16,234 | 5,432 | 21,666 |
| Lighting | 3,039 | 347 | 3,386 | 132 | 4 | 136 | 3,171 | 351 | 3,522 |
| Radio Nav-aid, Telecommunications & Meteorological Service Facilities | 7,143 | 194 | 7,337 | 0 | 0 | 0 | 7,143 | 194 | 7,337 |
| Utilities | 8,280 | 1,375 | 9,655 | 113 | 152 | 265 | 8,393 | 1,527 | 9,920 |
| Total of Works | 45,841 | 18,129 | 63,970 | 6,458 | 2,645 | 9,103 | 52,299 | 20,774 | 73,073 |
| Engineering | 4,584 | 1,813 | 6,397 | 646 | 265 | 911 | 5,230 | 2,078 | 7,308 |
| Land Acquisition | 0 | 353 | 353 | 0 | 0 | 0 | 0 | 353 | 353 |
| Contingency | 5,043 | 2,030 | 7,073 | 710 | 291 | 1,001 | 5,753 | 2,321 | 8,074 |
| Grand Total | 55,468 | 22,325 | 77,793 | 7,814 | 3,201 | 11,015 | 63,282 | 25,526 | 88,808 |

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- Note:
1. Unit prices used in the cost estimate are based mostly on the data collected by the JICA survey team from May to June in 1979.
 2. Engineering fee is estimated at 10% of the total cost of works.
 3. Contingency is estimated at 10% of the sum of the total cost of works, engineering fee and the cost of land acquisition.
 4. Conversion between one another of US Dollar, Guarani and Yen is based on the exchange rate as of June 1979 of US\$1.0 = G 140 = ¥220.
 5. If the cost rising trend of the last three years (1975-1978), namely 6.7% and 7.1% per annum for the local and foreign portion respectively were to continue through the year of completion of the Stage I construction, the total construction cost of the Stage I development would amount to US\$101.2 million, with local and foreign portions amounting to US\$29.1 million and US\$72.1 million respectively.

9. Construction Schedule

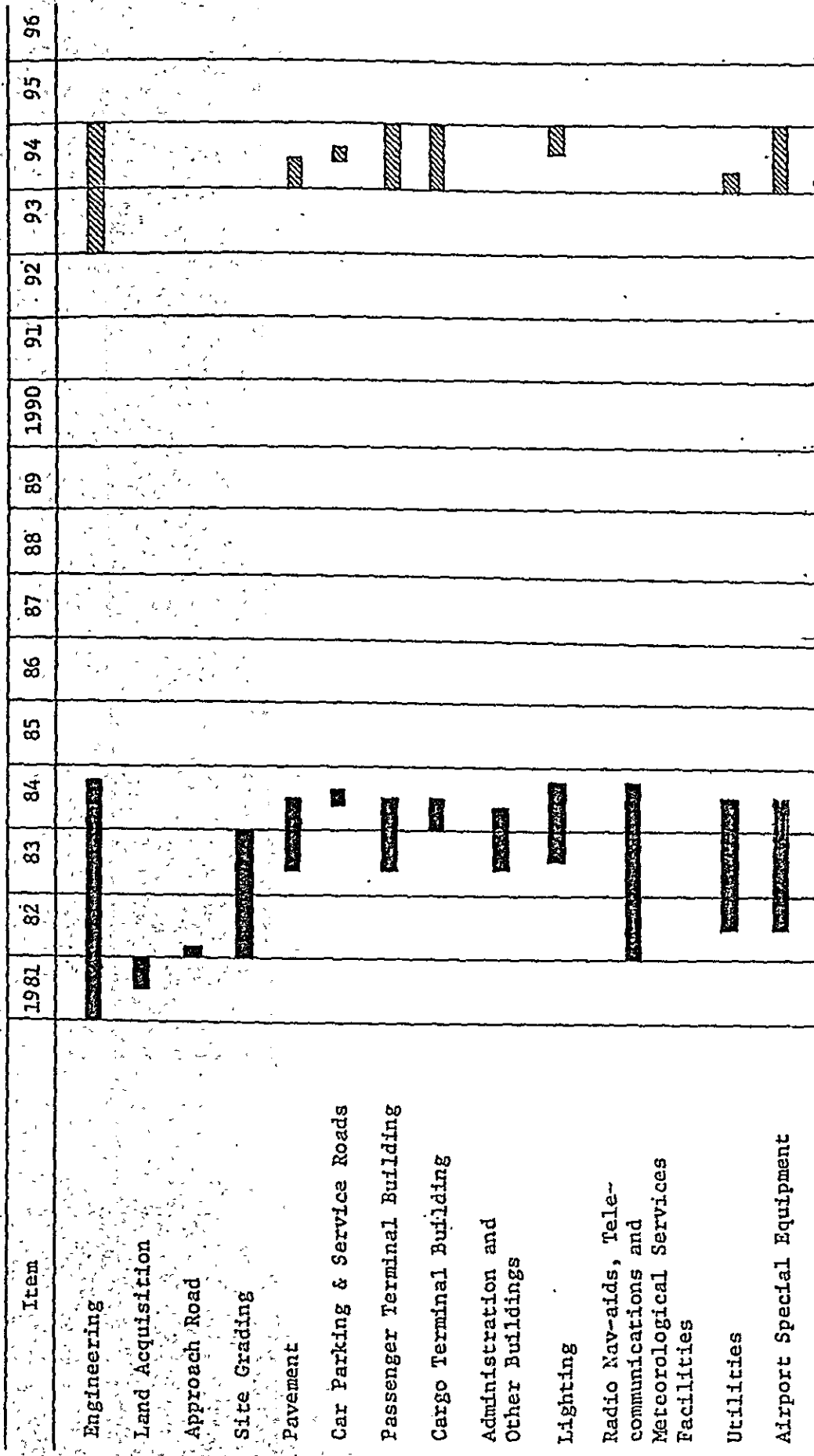
Construction schedule of the new airport was planned as shown in Fig. S-2 based on the assumption that the detailed design and land acquisition will have been completed by the end of 1981.

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Fig. S.2 CONSTRUCTION SCHEDULE OF NEW GPS AIRPORT

■ Stage I
 ▨ Stage II



10. Financial Analysis

The level of the landing fees and passenger service charges currently in force in Paraguay since 1974 are considerably lower than those of the neighboring countries, some being as low as one third of the 3-country average. The present JICA study has shown that if the airport tariffs of ANAC other than the taxi surcharge were to be raised at the rates and timing of the following two cases, the FIRRs of 3.8% and 5.6% respectively for Case 1 and Case 2 could be expected.

CASE 1 (FIRR=3.8%)

| | | | | |
|------|------------------|-------------------------|-------------------------|------|
| 1985 | Increase by 200% | over the present tariff | | |
| 1989 | " | 33.3% | over the raised in 1985 | |
| 1994 | " | 12.5% | " | 1989 |
| 1999 | " | 11.1% | " | 1994 |

CASE 2 (FIRR=5.6%)

| | | | | |
|------|------------------|-------------------------|-------------------------|------|
| 1985 | Increase by 200% | over the present tariff | | |
| 1989 | " | 66.7% | over the raised in 1985 | |
| 1994 | " | 10.0% | " | 1989 |
| 1999 | " | 9.1% | " | 1994 |

11. Economic Analysis

The cost-benefit analysis based on the cash flow of the economic costs and economic benefits identified from the viewpoint of national economy indicates an economic internal rate of return for the Project of 11%, higher by 1% than the social discount rate of Paraguay of 10%.

12. Project Implementation Organization and New CPS Airport Administration

Project Implementation Organization

It is recommended that an ad hoc team to be exclusively in charge of the Project implementation be established with in ANAC, and further that ANAC conclude a consulting contract for the design and supervision of construction of the New CPS Airport.

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New Airport Administration Organization

For the sake of efficient management and operation of the new airport, it is imperative to establish an independent administration organization. The New CPS Airport Administration will be headed by the airport director and comprise the Operations Division, Maintenance Division and Administration Division.

CONCLUSION

1. The New CPS Airport is indispensable for the national and regional economic development. It will also have no small a significance of becoming the first alternate airport in Paraguay to serve the capital gateway of Asuncion International Airport.
2. The Project will become financially feasible if operating revenue is increased by raising the airport tariffs to the level comparable to those of the neighboring countries.
3. The Project is economically feasible from the viewpoint of the national economy of Paraguay, since the economic analysis has revealed an economic internal rate of return for the Project that is higher than the social discount rate of Paraguay.



CHAPTER 1

CHAPTER 1 INTRODUCTION

1.1 General

The Government of the Republic of Paraguay has felt the need to develop some adequate airport facilities to serve Ciudad Presidente Stroessner (hereinafter referred to as CPS) which has been rapidly growing of late and which is expected to become a second new economic and industrial center of the country next to her capital of Asuncion. It also has long been a strong desire of the Republic to accommodate an alternate airport for her capital gateway of Asuncion International Airport within its own territory. In April, 1978, the Government of the Republic made an official request to the Government of Japan to render some technical assistance in connection with a possible construction of such an airport in the CPS area. In response to the request the Japan International Cooperation Agency (hereinafter referred to as JICA), a governmental agency entrusted with the matters related to international cooperation and assistance by the Government of Japan, sent a Project Identification Mission to Paraguay in December 1978 for the purpose of conferring with the officials concerned of the Government of the Republic and thereby to ascertain the basic requirements and potential of the new airport construction as well as of discussing the Scope of Works of the Feasibility Study (Appendix 1).

Upon determination of the Scope of Works, the JICA decided to undertake the present Feasibility Study for the Project, which was officially started in April 1979.

1.2 Objective and Scope of Study

The objective of the present Feasibility Study is to evaluate both technical and economic feasibility of the New Airport Construction Project with due regard for the future

development of economy and industry of the Republic and especially in and around CPS.

The scope of the Feasibility Study designed to achieve the said objective includes forecast of future air transport requirements of the CPS area, establishing the basic facility requirements to meet the forecast traffic demand, recommending to the Government of the Republic an optimum site for the contemplated airport development, and basic planning of the total airport facilities by recommended stage of development, followed by cost estimation and construction scheduling.

The foregoing technical and physical elements of the feasibility study is joined by a detailed financial analysis and an economic analysis of the Project, to form the basis for a comprehensive, overall evaluation of the Project. In addition to the above, the present study also includes recommendations as to the organization for the implementation of the Project and for the operation and maintenance of the new airport after it is completed.

1.3 Chronology and Sequence of Study

The methodology and work program of the Feasibility Study proposed by the JICA study team in the Inception Report were accepted by the Government of the Republic upon its presentation early in May 1979. The mission immediately thereafter proceeded with the field survey and reconnaissance which lasted through June 1979 and included site selection study, data collection and consultation with the Government of the Republic on planning criteria. The results of the site selection study were submitted in the Progress Report in June 1979, and the alternative site IV as recommended by the JICA study team was officially selected by the Government of Paraguay in July 1979 as the site for the new airport construction.

This was followed by the submission in October 1979 of the Interim Report containing all of the technical elements of the Feasibility Study including the airport facility and air-space use plan, construction schedule and cost estimate.

The non-technical elements of the Feasibility Study, namely the financial and economic analysis of the Project, as well as the recommendations on the organizations for the Project implementation and for the new airport operation, were then made, and the Draft Final Report containing the comprehensive results of the study was submitted to and accepted by the Government of the project country in December 1979, and finalized into the present Final Report to mark the completion of the Feasibility Study.

1.4 Supervisory Committee

The Supervisory Committee established by JICA as an advisory body to the president of JICA for the purpose of the implementation of the present feasibility study comprises the following members:

CHAIRMAN:

Hiroshi KATSUBE, Director of Construction Division,
Aerodrome Department, Civil Aviation
Bureau, Ministry of Transport

MEMBERS:

Akira OTAKE, Deputy Director of International
Affairs Div., Minister's Secretariat,
Ministry of Transport

Makoto TAKAHASHI, Deputy Director of Construction Div.,
Aerodrome Department, Civil Aviation
Bureau, Ministry of Transport

Takeshi TAZAKI,

Deputy Director of Flight
Standards Division, Engineering
Department, Civil Aviation Bureau,
Ministry of Transport

